

# B R E V I O R A

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### A NEW SPECIES OF *ELEUTHERODACTYLUS* (AMPHIBIA, SALIENTIA) FROM THE GUAYANA REGION, EDO. BOLIVAR, VENEZUELA

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**ABSTRACT.** A new species of *Eleutherodactylus*, *E. pulvinatus*, is described from the wet region of La Escalera, Estado Bolívar, Venezuela. The species is characterized by its small but distinct tympanum, poorly defined or absent vomerine teeth, large, transversely oval disks which are larger than the tympanum, a W-shaped marking on the occiput and non-spiny nuptial pads. The possible relationship between this frog and the genera *Eupsophus*, *Syrrhophus*, *Niceforonia*, *Trachyphrynus* and *Phrynopus* is discussed and evaluated.

Among the specimens recently collected by the author in the region of La Escalera, Estado Bolívar, Venezuela, there are seven specimens of a small and peculiar leptodactylid whose generic allocation has been somewhat difficult and problematical. In this species, the vomerine odontoids are very indistinct; in some individuals they appear to be absent altogether. As in *Eleutherodactylus*, the disks are well developed and the terminal phalanges are T-shaped, but there are two well-developed glandular pads on the inner side of the first digit, a character which does not seem to have been described in that genus.

It has been customary to allocate all *Eleutherodactylus*-like forms without vomerine teeth to the genus *Syrrhophus* (type locality, San Antonio, Texas) and all those with vomerine teeth but without disks to *Eupsophus* (type locality, Chile). In 1932, Parker violated convention by describing *Eupsophus wettsteini* (type locality, Pongo, Perú, 2000 m) as "the first species that has been described as belonging to the genus *Eupsophus* in which vomerine teeth are lacking" (p. 344).

Even a superficial examination reveals that Andean species of *Syrrhophus* are not closely related to the animals that are referred

to that genus in Central America and the United States. Whether or not they have vomerine teeth, most of the Andean animals seem to be closely related and should perhaps be called *Eupsophus* until a more thorough study can be undertaken and their relationships established. It is evident that the three groups of *Eupsophus* (*Thoropa*, *wettsteini-peruanus*, and the Chilean forms) mentioned by Cei (1960, 1962) constitute different evolutionary lines, one of which (*wettsteini-peruanus*) appears to continue along the Andean Cordillera to Venezuela, where *Eupsophus ginesi* is known from glacial streams in the páramos of the Mérida Andes. It is now usually recognized that *Thoropa* is a separate genus, and perhaps the *wettsteini-peruanus-ginesi* group should be recognized as another, in which case, *Oreobates* Jiménez de la Espada, 1872, might appear to be the appropriate name. Yet, although *Oreobates* was described from Quijos (whence the name *quixensis*), and this name has been interpreted to mean Quito (Peters, 1955: 347; Gorham 1966: 117), Espada himself states: "It occurs in the Oriental province, formerly Quijos, in Ecuador, at the foot of the Cordillera" (Vertebrados del Viaje del Pacífico, 1875: 104). Specimens from the Napo-Pastaza region in the M.C.Z. correspond to the description of *quixensis*, which looks more like a *Thoropa* than a *Eupsophus*.

Two new genera, each based on a single individual from the high elevations of the Colombian Andes, were described by Goin and Cochran in 1963. The first, *Niceforonia*, has distinct vomerine teeth, no disks and no external tympanic disk; the other, *Trachyphrinus*, has no vomerine teeth but has small disks (and T-shaped phalanges) and a well-defined tympanum. In general physiognomy, both of these genera resemble the group of frogs here considered, and *Trachyphrinus* does not look at all like *Syrhophus*, the genus in which it would be included if its classification were to be based on conventional morphological characters.

But all kinds of combinations of characters have been described in the high elevation species from Perú to Venezuela. Thus, in 1873, Peters described *Phrynopus peruanus* (now called *Eupsophus*, *fide* Gorham, 1966) with vomerine teeth and tympanum, but apparently without disks. The same combination is found in *Borborocoetes columbianus* Werner (now *Eupsophus*, *fide* Gorham, 1966), *Paludicola festae* Peracca (now *Syrhophus*, *fide* Gorham, 1966), and *Eupsophus ginesi* Rivero. However, in *Paludicola simonsii* Blgr. (now *Syrhophus*, *fide* Gorham, 1966), *Syrhophus montium* Shreve and *Syrhophus juninensis* Shreve (both now *Syrhophus*, *fide* Gorham, 1966) there are no vomerine teeth,

external tympanic disk, or disks. In *Eleutherodactylus whymperi* (Blgr.) and *E. surdus* (Blgr.), on the other hand, vomerine teeth and disks are present but the tympanum is not apparent externally, while in *Eupsophus wettsteini* there are no vomerine teeth or disks but there is a small tympanic disk. *Trachyphrynus myersi* and *Syrrhophus areolatus* Blgr. are alike in having disks and external tympana (small and ill defined in *S. areolatus*) but no vomerine teeth.

It is not the purpose of this paper to enter into the many problems pertaining to this interesting group (or groups?) of frogs. But these digressions have been necessary because of the difficulty of allocating the new species described in this paper. If this group of Andean frogs is found to constitute a natural assemblage, perhaps the name *Phrynopus* can be used for it. It is also possible that it may constitute two or more evolutionary lines, in which case the genera suggested by Goin and Cochran may be found useful. It appears to me, however, that this group, or most of it, constitutes a latitudinal extension of Chilean and Argentinian *Eupsophus* along belts of similar climatic conditions in the Andes. If, as has been reported, some of the species are limited to páramos in the Andean Cordillera, their present diversification is to be expected. In a group where the tympanum-vomerine odontoids-disks can occur in so many combinations, separation into various genera is hardly convenient and may actually be very confusing.

A number of "*Syrrhophus*" have been described from the lowlands or at most, from elevations below 800 m in Ecuador. Such is the case, for example, with *S. chalceus* (Peters), *S. calcaratus* Andersson, and *S. coeruleus* Andersson. *S. chalceus* has also been reported by Lutz and Kloss, 1952, from Iuarté, along the Río Uaupés. As the largest of the species described was 30 mm (*S. coeruleus*), all the others ranging from 18 to 29 mm, it is not improbable that the lack of vomerine teeth can be attributed to immaturity in some of them. It is possible, however, that they represent another line of *Eleutherodactylus* without vomerine teeth (since in this genus disappearance of the vomerine teeth does not seem to be a difficult process) or that they are in some way connected with the *Eupsophus* group from Chile and/or the more northern Andes.

*Eleutherodactylus pulvinatus*, the species described here, does not have the rotund physiognomy of the *Eupsophus* group, and its distribution does not suggest relationship. Nuptial pads have been described for some members of the Andean group (Parker, 1932:

363), but most of the species do not seem to have them. In the Chilean species (Cei, 1962), on the other hand, and in *Thoropa* (Cochran, 1955: 91), thumb and sometimes breast and axillar spines have been described for those species in which males are known. Similar modifications have been described for *Crossodactylodes* Cochran (type locality Macaé, Río de Janeiro), a monotypic genus with hidden tympanum and the vomerine teeth represented only by a roughened ridge. In view of the foregoing considerations, it has been found preferable to describe the new leptodactylid in the genus *Eleutherodactylus*, pending a more complete study of its anatomy and relationships.

*ELEUTHERODACTYLUS PULVINATUS* sp. n.

*Type.* M.C.Z. 64741, ♂, Paso del Danto, Región de la Escalera around 1400 m above San Isidro, road from El Dorado to Sta. Elena de Uairén, Estado Bolívar, Venezuela. Coll. J. A. Rivero and J. Pulido, 26 March 1968.

*Diagnosis.* A small *Eleutherodactylus* with small but distinct tympanum, vomerine teeth poorly defined or absent; two non-spiny nuptial pads on the inner side of the first digit of males; large transversely oval disks, larger than the tympanum; first finger shorter than second; adpressed heel extending to between eye and nostril; and a W-shaped marking behind the occiput.

*Description.* Head as long as broad; snout short, subtriangular; tongue free and slightly nicked behind; vomerine odontoids faintly indicated as two irregular elevations well behind and between the small choanae; eye diameter slightly greater than distance between eye and nostril but shorter than snout; interorbital space as broad as an upper eyelid; canthus rostralis rather indistinct, curved; loreal region only slightly sloping, concave; tympanum distinct,  $\frac{1}{3}$  the eye diameter; a flat, indistinct supratympanic fold; a line of small, whitish tubercles from elbow to wrist; two distinct, oval, metacarpal tubercles; a glandular pad at the base of the inner side of the first finger and another one distal and slightly dorsad to this; first finger shorter than second, its disk much broader than the phalanx; all fingers free; larger disks larger than the tympanum; a small, flat, whitish tubercle at the distal portion of the tibial segment; a distinct and prominent inner and an indistinct outer metatarsal tubercle; toes free, with prominent subarticular tubercles; heel of the adpressed hind limb extending to between eye and nostril. Skin above, shagreened, more coarsely tubercular in the tympanic area and anterior flanks. Below, finely granular on

throat and anterior part of the belly; more distinctly granular on posterior part of the belly and thighs. A very large subgular vocal sac with a triangular anterior end; a space (about 2 mm) between tip of the jaw and anterior edge of sac. A "frenulum" in the anterior tip of the sac continues anteriorly almost to the tip of the jaw.

*Color.* Above, brownish gray, with a dark brown interorbital bar, a black supratympanic streak, a W-shaped marking on the anterior part of the back, and some large blotches and small spots on the posterior two-thirds of the back; on the flanks the blotches continue ventrally, forming oblique, wavy bars that are separated by light gray areas; anterior and posterior part of the thighs uniform brown, this color extending as bars across the gray color of the upper part of the thighs; limbs and fingers with cross-bars and blotches; upper lip with triangular blotches on a gray background; no canthal streak. Ventral surfaces dirty white, darker on the throat and distal portion of the limbs.

*Measurements* (in mm). Snout-vent 26.1; head breadth 9.8 (between tympana); head length 10; femur 13; tibia 14.1; foot 11.

*Paratypes.* There are six paratypes (U.P.R.-M.<sup>1</sup> 02214-02219), all coming from the type locality. All are males, and the size varies from 26.1 mm to 23 mm. In some of the smaller specimens the canthus seems to be less defined than in larger specimens, and a cross-section of the snout would be more or less rounded if it were not for the slight concavities of the loreal areas. The heel of the adpressed hind limb extends to the nostril in only one specimen, but the skin of the dorsal surfaces is more granular than in the type, at least in two examples. The belly and thighs are uniformly granular, the throat more finely so in most specimens. The vocal sac does not form the anteriorly triangular pouch that it forms in the type, but it is possible that it has been displaced, as a similar condition can be noticed in several specimens. The W-shaped marking is present in all specimens, but the oblique bands of the flanks are less distinct in some, although a trace of them can be noticed in all. Vomerine odontoids cannot always be seen, but they can be felt with a needle. They seem to be irregular in both size and position, and in some specimens seem to be almost totally absent.

*Habits and relationships.* All the specimens were collected at night, calling from low bushes (1 to 3 ft. from the ground) along the rocky bank of the road at an elevation of approximately 1400 m. At dusk, their calls seemed to come from under the rocks

<sup>1</sup> University of Puerto Rico — Mayagüez.

lining the almost vertical road bank, but none could be collected at the time. Later at night, their calls were traced and recorded, and the various specimens collected. In the dark the frogs are yellow or cream, but they turn dark gray in the daytime. Their voices were not heard much below the elevation where all the specimens were obtained. No other species of *Eleutherodactylus* was collected or heard in this area.

Only scattered low bushes, some soil bromeliads and, occasionally, thickets of lilaceous plants occur in the rather open areas where *E. pulvinatus* was collected. There were permanent and temporary streams everywhere, as the region is probably one of the rainiest in Venezuela.<sup>1</sup> The forest, 50 to 60 meters from the road, is a rather open montane forest, usually with many epiphytic bromeliads, orchids, and araceans. Most of the soil is a white quartziferous sand, which is covered in the forest by a layer of dead leaves and other organic matter.

Although many *Eleutherodactylus* have W-shaped markings on the back, the distinct markings of *E. pulvinatus* remind one of the condition of *E. w-nigrum* (Boettger), which, however, is a species from more than 3000 m in the Andes of Ecuador. Other species, from relatively adjacent regions, are: *E. inguinalis* Parker (New River, Guyana), *E. beebei* Cochran (Kartabo), *E. pliciferus* (Blgr.) and *E. ramagii* (Blgr.) (Iguarasú, Pernambuco, Brasil), *E. crepitans* Bockermann (San Vicente, Matto Grosso), *E. carvalhoi* B. Lutz (Itacoai R., NW Brasil), *E. peruvianus* (Melin) (Roque, Perú), *E. vilarsi* (Melin) (Taracua, Río Uaupés), *E. rosmelinus* Gorham (Río Uaupés), *E. melini* Bokermann (Roque, Perú), *E. altamazonicus* Barbour and Dunn (upper Amazon) and *E. marmoratus* (Blgr.) (Mt. Roraima). In all these species there are well-defined vomerine teeth, and nuptial pads have not been described for any. *E. inguinalis* has on obtusely angular canthus, a broad interorbital space, much broader than the upper eyelid, and a black bordered, inguinal ocellus; *E. beebei* Cochran is a large species 85.5 mm in length; in *E. pliciferus* and *E. ramagii* the first finger is longer than the second; *E. crepitans*, from dry forest, is similar to *E. conspicillatus*, and its tympanum is  $\frac{2}{3}$  the eye diameter; *E. carvalhoi* does not have a tympanum; *E. peruvianus* and *E. vilarsi* are 50 and 39 to 41 mm, respectively, and may be synonyms of *E. conspicillatus*; *E. rosmelinus* has a depressed head, disks  $\frac{1}{3}$  the size of the tympanum and first finger

<sup>1</sup> According to a report in a local newspaper, engineers working on the road from El Dorado to Sta. Elena could only work 60 to 80 days of the year, and even those were not always sunny days without any rainfall.

longer than second; *E. melini* has an indistinct tympanum and small disks; *E. altamazonicus* has a depressed and oval snout and a barely distinguishable tympanum; and *E. marmoratus* has a rounded snout as long as the orbital diameter, dark-edged marblings on the head, and a small size (only topotypical specimen: 19 mm).<sup>1</sup>

From the lowland "*Syrrhophus*" mentioned before, *E. pulvinatus* can apparently be distinguished by the nuptial pads it has in the inner side of the first finger. Other differences are as follows: In *S. chalceus* (Peters), from Pastaza River, the first finger is longer than the second; in *S. coeruleus* Andersson, from eastern Ecuador, the canthus is distinct and there are two pairs of dorsolateral folds; and in *S. calcaratus* Andersson,<sup>2</sup> from near Archidona, 800 m, there is a canthal streak, and the disk of the first finger is only slightly broader than the phalanx behind it.

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<sup>1</sup> Frogs collected in Mt. Marahuaca by the author (Rivero, 1961: 80) and pronounced conspecific with *E. marmoratus* by Parker, do not represent *E. pulvinatus*. However, further comparisons should be made when more specimens of *E. marmoratus* become available.

<sup>2</sup> Among the group of frogs here discussed, the species name *calcaratus* was first used by Günther, 1881, for *Cacotus calcaratus*, now considered a synonym of *Eupsophus roseus*.

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Fig. 1 A, B. *Eleutherodactylus pulvinatus*, type, M.C.Z. 64741, from Paso del Danto, region of La Escalera, Estado Bolívar, Venezuela. A. Dorsal view; B. Lateral view of head region.